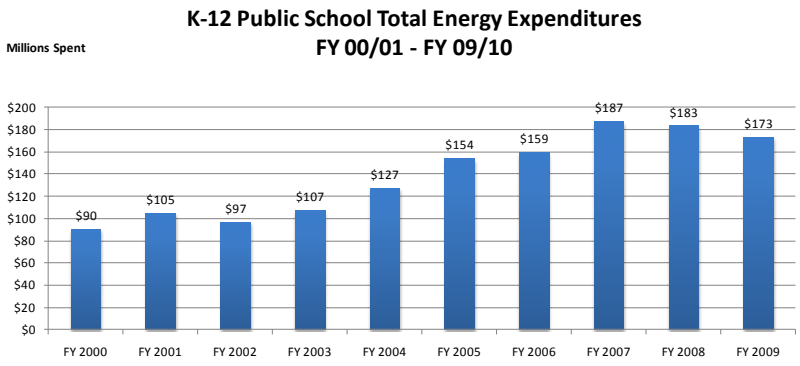
Department for Energy Development and Independence

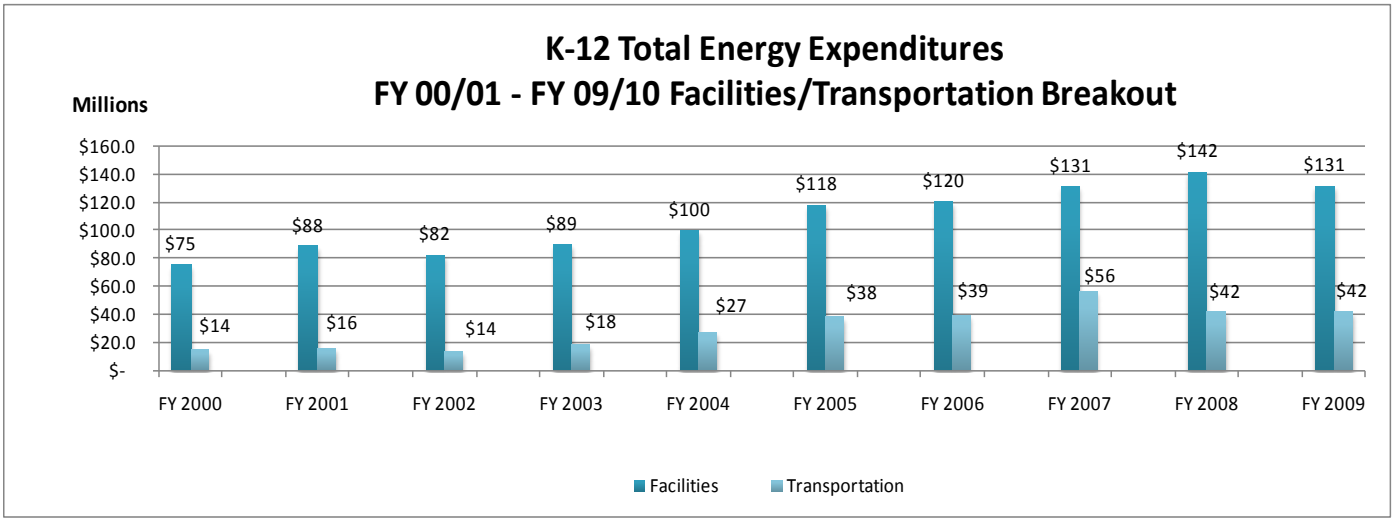
Kentucky Energy Watch

[special edition]

In 2006, Kentucky was home to only six ENERGY STAR rated schools. It wasn't long before the districts that built the schools began to realize significant energy cost savings. In the past five years school districts across the Commonwealth have come to recognize the importance that reduced energy consumption has over their bottom line. As of the printing of this publication, Kentucky is home to 90 ENERGY STAR Schools, and by no coincidence. ENERGY STAR Schools are not only healthier learning environments for students, but have morphed into hands-on teaching tools for faculty, staff, and students. As energy costs continue to increase, it is now paramount that school administrators take heed of the energy cost savings realized by school districts following ENERGY STAR standards so that they, too, may cut their district's energy costs, reduce their carbon emissions and put those cost-savings back into their school systems for teachers and curriculum. This publication is meant to share information on the benefits of ENERGY STAR rated schools and to celebrate the successes of the Commonwealth's move toward more healthy and energy efficient school buildings. All data are from the Kentucky Department of Education and the U.S. Department of Energy, Energy Information Administration.

- Kentucky's K-12 public schools spent $173 million for energy during the 2009-2010 school year.
- This is $83 million, or 92 percent, higher than the energy costs for the 2000-2001 school year.
- Much of this increase results from higher energy prices and increased facility use.
- Since 2000, total annual expenditures have increased at a compounding interest rate of 7.5 percent each year.





Kentucky Energy in Education Collaborative

The Energy in Education Collaborative is a partnership created by DEDI, that includes four programs and two projects. The program elements of the collaborative are designed to be a comprehensive, holistic approach to focusing on energy and sustainability issues in the design, construction and operation of energy-efficient sustainable schools as well as addressing educational/curriculum opportunities presented by this focus.

The SEMP (School Energy Managers Project) is administered by the Kentucky School Boards Association. Under this program, SEMP uses ARRA funding to pay a portion (75 percent the first year and 50 percent the second year) of the salary for energy managers at the local district level. SEMP is funding 35 energy managers serving some 130 school districts and, for 4 districts that already had full-time energy managers, SEMP helps fund energy curriculum coordinators. A number of other districts already have energy managers on staff. The school energy managers are the front-line managers responsible for coordinating energy efficiency and sustainability programs in the district.

The KEEPS (Kentucky Energy Efficiency Program for Schools) activity is administered by the Kentucky Pollution Prevention Center at the University of Louisville's J.B. Speed School of Engineering. KEEPS provides technical consulting services to Kentucky's 174 public school districts thereby supporting the SEMP managers. Specifically, KEEPS conducts school energy assessments, provides training for school energy managers and assists them with establishing energy teams and implementing a structured energy management programs using the proven ENERGY STAR model.

The Kentucky NEED (National Energy Education Development) Project is part of a national non-profit organization that focuses on energy curriculum development. NEED provides energy workshops for teachers, grade-appropriate curriculum materials and kits for energy activities in the classroom. NEED has a program to assist schools with the formation of student-based energy teams that study how energy is used in the school. NEED also works with DEDI to produce an annual High Performance Schools workshop focused on the best practices for design of new schools. The workshop target audience is architects, engineers and school officials, particularly those officials who are from districts that plan to build or renovate within two years.

The Kentucky Green and Healthy Schools (KGHS) program is administered by the Kentucky Environmental Education Council in the Education and Workforce Development Cabinet. This inquiry-based program uses the entire school complex as a learning laboratory for students. Students conduct inventories in nine different areas, including energy. They then develop and implement improvement projects in each area, receiving awards and recognition as certain milestones are reached.

An additional, unfunded program partner is the Kentucky School Plant Management Association that provides energy efficiency-oriented training and workshops to school facilities personnel and facilitates the exchange of "best practice" information among peers. The two projects in education involve two new schools that were occupied in the fall of 2010 – Richardsville Elementary School (Warren County Public Schools) and Turkey Foot Middle School (Kenton County School District). Each of these schools was designed to be very energy efficient. So much so, that they are projected to use only about one-forth as much energy as the typical school built to meet Kentucky's building energy codes. DEDI has awarded Richardsville Elementary $1.3 million and Turkey Foot Middle $2 million to pay a portion of the cost to install sufficient photovoltaic solar capacity to make each of the schools a net-zero energy school – among the first public schools in the nation to achieve this.

Kentucky's Energy in Education Collaborative Partners:

School Energy Managers Project
Kentucky School Boards Association
http://www.ksba.org/energy-management
260 Democrat Drive
Frankfort, Kentucky 40601
(800) 372-2962

Kentucky NEED
www.need.org
P.O. Box 176055
Covington, KY 41017
(859) 578-0312

Kentucky Department for Energy Development and Independence (DEDI)
http://energy.ky.gov
500 Mero St., 6th Floor
Frankfort, KY 40601
(502) 564-7192

Kentucky Energy Efficiency Program for Schools (KEEPS)
University of Louisville's Kentucky Pollution Prevention Center
https://louisville.edu/kppc/keeps
Louisville, KY 40292
(502) 852-0965

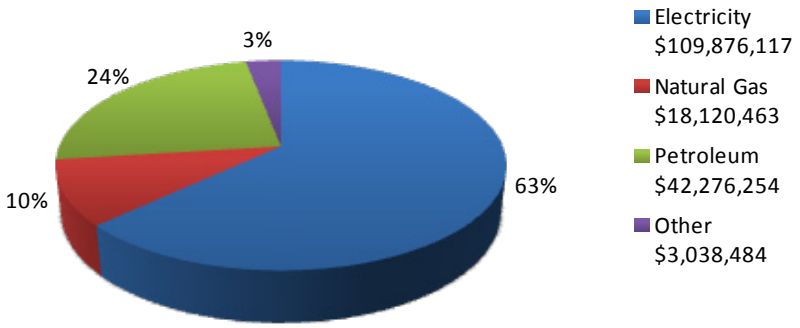
Kentucky Green and Healthy Schools
http://greenschools.ky.gov/500 Mero Street
2107 Capital Plaza Tower
Frankfort, KY 40601
(502) 564-5937

Kentucky School Plant Management Association
http://www.kspma.org/
P.O. Box 4559
Lexington, KY 40544
(859) 296-1343

Energy expenses by type for the 2008-2009 school year are shown on the pie chart. The top three expenses are electricity (63%), petroleum (24%), and natural gas (10%).

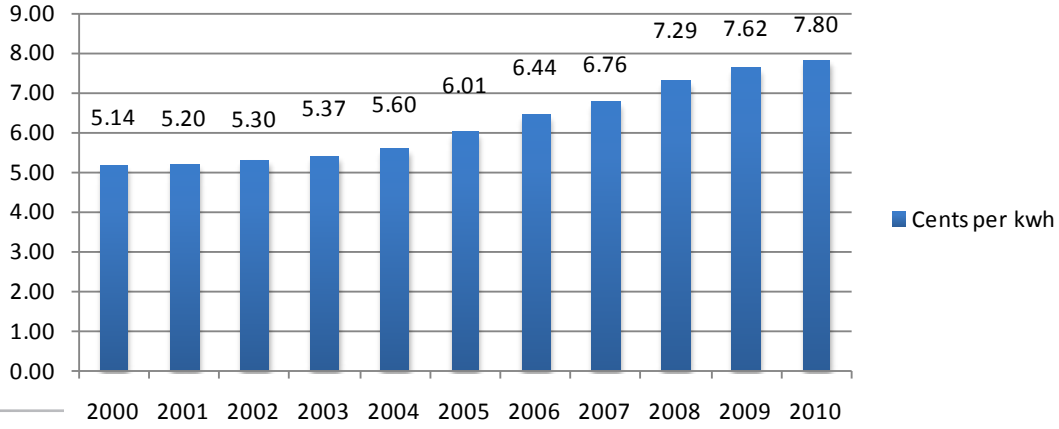
Since the 2000-2001 school year electricity expenditures have increased by more than $84 million (93%), natural gas by more than $5 million (43%) and transportation fuel (petroleum) by more than $28 million (186%).

KY K-12 Public Schools Total Energy Expenditures by Energy Type FY 00/01 - FY 09/10



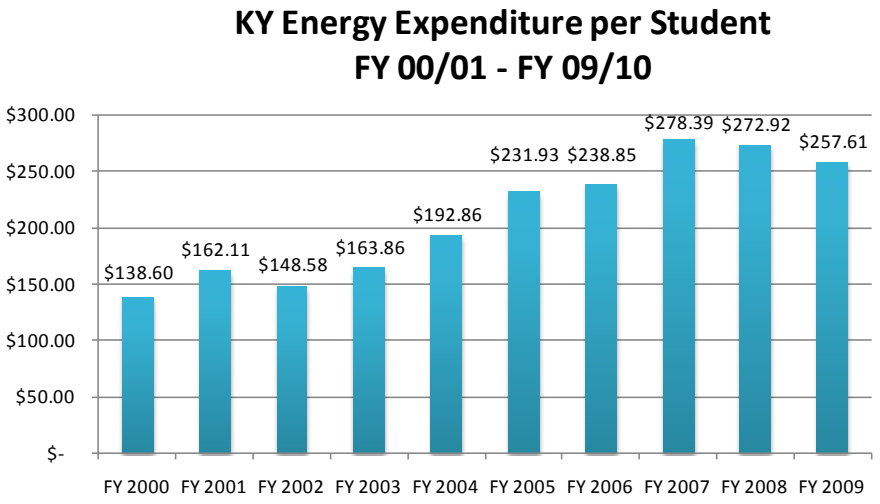
- These trends reflect increases in Kentucky's energy prices.
- Since 2000, Kentucky's commercial sector electricity prices have increased by 52 percent.
- Diesel fuel prices in Kentucky have increased by 162 percent since 2001.

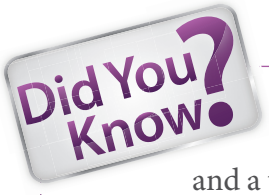
Kentucky Average Commercial Electric Price FY 00/01 - FY 09/10



Kentucky's 174 public school districts reported their 2008-2009 energy expenditures to the KDE.

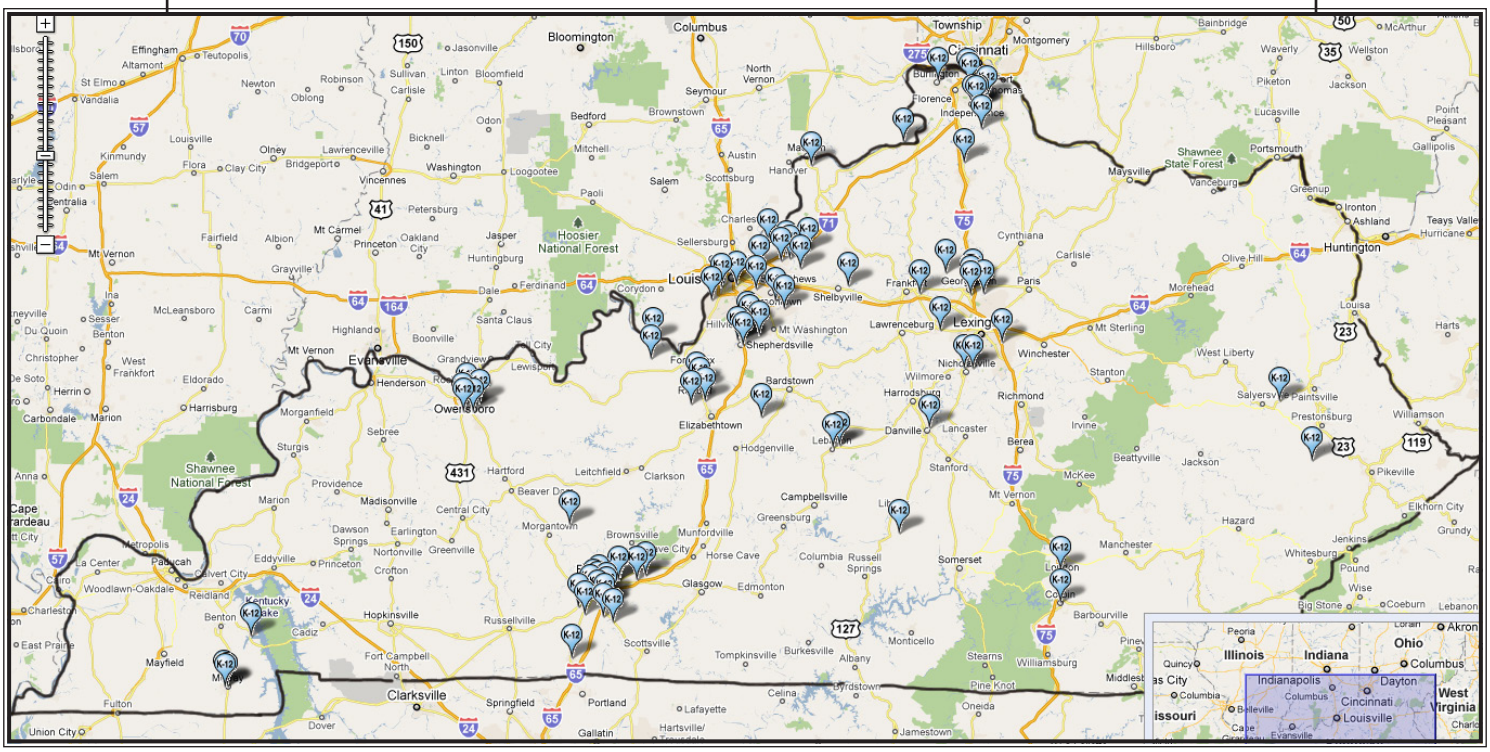
- Annual total energy expenditures by Kentucky public school district range from $26 million to less than $41,019.
- Total energy expenditures for Kentucky public school districts was $173 million.
- The average daily attendance for Kentucky's public schools was 672,771 students for the school year.
- Dividing the total energy expenditures by the number of students results in an average energy expense per student of $257.61.
- Since 2000, cost per student has increased nearly 86%.





ENERGY STAR labeled school buildings can reduce energy expenditures between $20,000 and $50,000 per year for the life of the building. With several such buildings in a district and a thirty year building life span this can represent millions of dollars. This is money that can be spent on more important needs such as books, computers and teacher salaries.

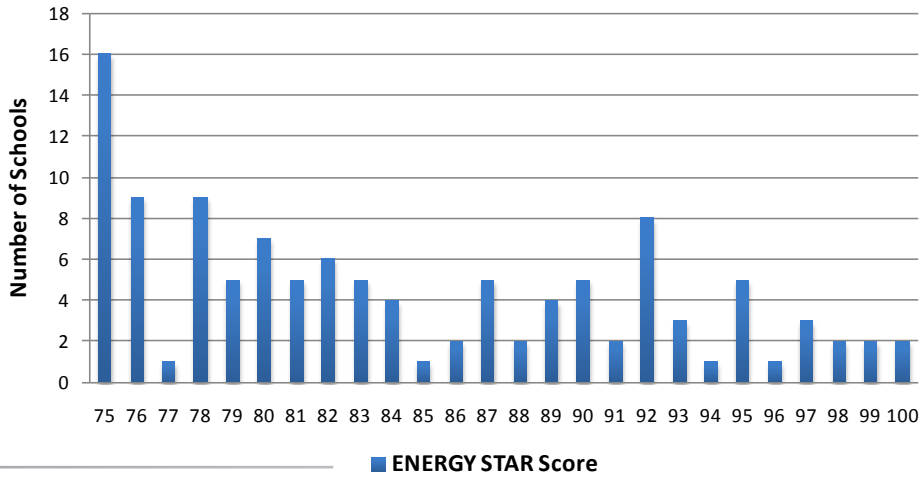
The map below displays locations of ENERGY STAR labeled schools in Kentucky



Source: www.energystar.gov

Kentucky Schools by ENERGY STAR Score

To earn the ENERGY STAR, a building or manufacturing plant must score in the top 25 percent, based on EPA's National Energy Performance Rating System. To determine the performance of a facility, EPA compares energy use among other, similar types of facilities on a scale of 1-100; buildings that achieve a score of 75 or higher may earn the ENERGY STAR.



The chart below lists the number of ENERGY STAR labeled public school buildings in Kentucky.

School District	Number of ENERGY STAR rated schools (as of 4/22/2011)
Boone County School District	2
Bowling Green Independent	1
Bullitt County Public Schools	7
Butler County Schools	1
Calloway County Schools	1
Casey County Schools	1
CMTA Consulting Engineers	1
Corbin Independent Schools	1
Danville Independent Schools	1
Daviess County Public Schools	6
Fayette County Public Schools	1
Floyd Co. Schools	2
Franklin Co. Board of Education	1
Gallatin County Schools	1
Grant County Board of Education	1
Hardin County Schools	5
Jefferson County Public Schools	8
Jessamine Co. Board of Education	1
Jessamine County Schools	1
Kenton County School District	7
Laurel County Schools	1
Magoffin County Schools	1
Marion County Schools	2
Marshall County Schools	1
Meade County Schools	2
Murray Independent Schools	2
Oldham County Schools	5
Scott County Schools	6
Shelby County Public Schools	1
Simpson County Board of Education	1
Trimble County Public Schools	1
Warren County Public Schools	16
Woodford County Board of Education	1
Total	**90**

Kentucky: A Leader for High Performance Schools

The phrase 'times are tough' is not a cliché for school districts across the Commonwealth. The fact that budgets have been dramatically slashed at all levels for K-12 schools has driven many administrators to look for solutions that have been hiding under their noses for years: energy reduction. As districts look for sustainable solutions to reducing their operational costs, school administrators are quickly learning that high performance school buildings are the way to go. Not only do high performance buildings help districts save money by reducing their energy usage, the buildings also provide a healthier environment for teachers, students and staff. High performance school buildings provide better learning environments for students and teachers, cost less to operate and help protect the environment. In the past decade Kentucky K-12 public schools have become leaders in transitioning to these remarkable facilities.

Richardsville Elementary's Energy Team provides school tours for workshop attendees.

On March 22-23 school administrators from across the Commonwealth gathered in Bowling Green to attend the annual High Performance School Buildings Workshop, sponsored by KY National Energy Education Development Project (KY NEED) and the Kentucky Department for Energy Development and Independence. The two-day event gave school administrators, teachers and facility managers the opportunity to learn about the foundation and benefits of building a high performance school and also the chance to tour two high performance school buildings, T.C. Cherry Elementary (Bowling Green Independent School District) and Richardsville Elementary (Warren County Public Schools).

"It was very clear that those who attended this year's workshop are excited about what high performance design and construction contributes to a school learning environment," said Karen Reagor, Kentucky State Director of KY NEED. "This year, more than ever, the message was that high performance sustainable schools are a reality, right here in Kentucky--the two schools we toured confirmed that."

During the workshop attendees learned the trademarks of a high performance school building and what benefit their districts could see from such construction. Throughout the workshop, participants learned that a high performance school building has three vital characteristics: 1) the building is a healthy and productive place for students and teachers; 2) the building is cost effective to operate and maintain; 3) the building's impact features are sustainable because they conserve energy, water and resources.

An important lesson learned from this year's workshop is that a high performance school building is not difficult to create, but does require the school district to take a holistic approach to the design process. A high performance school building is the result of an integration of systems and technologies that works together to create overall efficiency in every sense of the word. Comfort and productivity for students and teachers comes from the beginning stages of creating a high performance school and cannot be achieved as an afterthought upon construction. School districts must work with architects, engineers, facility managers and school boards to integrate the building blocks of high performance buildings, including energy analysis tools that optimize energy performance; a life cycle cost approach that reduces the total costs of ownership; a process that ensures the facility will operate in a manner consistent with design intent; high levels of acoustic, thermal, and visual comfort; large amounts of natural daylight; superior indoor air quality; energy conservation and renewable energy strategies; high performance mechanical and lighting systems; environmentally responsive site planning; environmentally preferable materials and products; and water-efficient design.

If your school district is ready to start saving on energy, water and resource costs and wants to create healthier learning spaces for students, high performance building is the way to go.

ENERGY STAR 100 RATED

Crestwood Elementary

Crestwood Elementary School's Energy Team. Courtesy of Oldham County Schools

School District: Oldham County Schools
Principal: Lori Wright
Superintendent: Paul Upchurch
Year school was built: January 2009
Architecture Firm: McCulloch Associates Architects
Engineering Firm: CMTA, Inc.
Size of school building: 86,600 Square Feet
Cost per square foot: $191.00
Consumption: 28.9 kBtu/SF/Yr - $0.66/SF/Yr

"Everyone should take great pride in earning this distinction. All of these schools have set the standard for energy efficiency."

- Kentucky First Lady Jane Beshear

Energy Efficiency Features:

- Insulated concrete forms construction
- Geothermal water source heat pumps (two stage compressors) with distributive pumping
- Direct digital temperature controls
- Accurate building scheduling
- Lighting controls/occupancy sensors (low light density)
- High performance glass in windows

Q&A *with Oldham County Schools' Superintendent Paul Upchurch*

Why did Crestwood Elementary decide to aim for a high level of energy efficiency?
We set these goals in order to reduce the district's energy consumption and save valuable dollars.

Why is energy efficiency & conservation important to your school district?
Saving energy allows the district to channel precious tax dollars back into the classroom for students and programs.

What behavioral-change initiatives are being implemented for staff, faculty & students?
The Oldham County Board of Education supported and passed an energy conservation policy that encourages energy savings while still maintaining comfortable learning environments.

ENERGY STAR 100 RATED

Milton Elementary

Courtesy of: Milton Elementary School.

School District: Trimble County Schools
Principal: Sharon James
Superintendent: Marcia Haney Dunaway
Year school was built: August, 2009
Architecture Firm: Scott-Klausing and Co.
Engineering Firm: CMTA, Inc.
Size of school building: 47,300 Square Feet
Cost per square foot: $149.46

"Trimble County Schools are serious about being good stewards of public funds. In the design and construction of Milton Elementary they worked with the engineers and architects to build a low-cost energy efficient facility. As a result they were able to build one of the lowest cost per square foot facilities in the state in 2009. The efficiency of the school will continue to preserve public funds over the life of the facility."

-Sherman Adams - Energy Manager

Energy Efficiency Features:

- High efficiency light fixtures and lamps
- Daylighting in all classrooms and community spaces
- Automated lighting controls
- Temperature control setback
- Building energy management control system
- Computer equipment shut off controls
- Superinsulated roof-wall-ceiling assembly
- Interior windows for daylight enrichment

Q&A *with Trimble County Schools' Superintendent Marcia Haney Dunaway*

Why did Milton Elementary decide to aim for a high level of energy efficiency?

We wanted to make a statement about fiscal and environmental responsibility as the building owner and to engage energy efficiency in the design or operations in our new Milton Elementary School.

Why is energy efficiency & conservation important to your school district?

It made good economic sense and helps to protect the environment.

What behavioral-change initiatives are being implemented with staff, faculty & students?

The school asks staff and students to be aware of energy savings by turning off lights and computer monitors, closing doors to conserve heat, unplug items during breaks, etc.

DESIGNED TO BE NET-ZERO

Richardsville Elementary

Courtesy of: Richardsville Elementary School.

School District: Bowling Green, Kentucky (Warren)
Principal: Kory Twyman
Superintendent: Tim Murley
Year school was built: 2009-2010
Architecture Firm: Sherman Carter Barnhart
Engineering Firm: CMTA, Inc.
Size of school building: 72,285 Square Feet
Cost per square foot: $168.22

Energy Efficiency Features:

- Geothermal HVAC system utilizing dual compressor heat pump units
- High performance building envelope featuring insulated concrete forms
- High performance roof system, including 348kW solar PV system
- Active daylighting with automated daylight-dimming controls
- Low-E, argon filled, UV-coated vinyl vision windows
- Low-flow toilets and urinals
- Building orientation - building was placed within a north-south orientation for maximum exposure to daylight and solar absorption

Conservation Programs/Curriculum

Geothermal Hallway Display - Components of the geothermal system, along with temperature gauges, offer students the chance to watch the system at work.

Solar Hallway Display - Allows students to see the output of solar panels being transferred to laptop batteries.

Water Conservation Hallway - Displays information about rainwater collection and filtration through site bioswales.

Recycling Hallway - Includes bins for recycling while measuring quantities of waste. An outdoor compact weather station gathers data continuously and uploads this information to the Internet, encouraging students to compare the building's performance through Kentucky's four distinct seasons.

The building's outdoor classroom is fitted with a wireless, solar-operated outdoor weather station capable of measuring rainfall, temperature, humidity, wind speed, solar and UV radiation. It includes software to upload information automatically to the building's media center and to the Internet.

The Warren County Water Company donated an interactive display for student educational purposes, featuring a display mascot. "Splash" travels throughout the water cycle, featuring rivers, ground water, streams, etc. The display also presents water wise tips and other saving ideas.

DESIGNED TO BE NET-ZERO

Turkey Foot Middle

Courtesy of: Turkey Foot Middle School.

School District: Kenton County School District
Principal: Tom Arnzen
Superintendent: Tim Hanner
Year school was built: 2010
Architecture Firm: PCA Architecture
Engineering Firm: CMTA, Inc.
Size of school building: 134,000 Square Feet
Cost per square foot: $191.85/sq. ft with solar
$172.97/sq. ft without solar

"ENERGY STAR is an outward sign that energy efficiency and conservation is embedded into the culture of the Kenton County School District. Our students are creating a culture of environmental stewardship throughout the district and community."

Tim Hanner , Superintendent, Kenton County School District

Energy Efficiency Features:

- Enhanced geothermal HVAC including variable speed heat pumps, variable load compressors, and a distributed pumping system.
- Insulated concrete form walls
- Rainwater harvesting system for future reuse in school toilets and urinals
- Energy efficient kitchen equipment and cooking methods
- LED exterior lighting
- Demonstration vegetative roof
- Environmentally friendly building materials
- 400kW photovoltaic system installed along entire roof, creating the largest solar array in Kentucky.

Q&A *with Kenton County Schools' Superintendent Tim Hanner*

Why did Turkey Foot Middle School decide to aim for a high level of energy efficiency?

The Kenton County School District believes school buildings should use less energy, demonstrate sound environmental practices and serve as fundamental tools for learning.

Why are energy efficiency and conservation measures important to your school district?

Energy management is a critical component of the Kenton County School District's mission and vision to prepare students for the global workplace and market.

What behavioral-change initiatives are being implemented for staff, faculty & students?

The E=WISE2 (Education creates Wisdom in Saving Energy and the Environment) program, a student-led energy education program created in partnership with the NEED (National Energy Education Development) Project is the foundation of the District's behavioral-change initiative. This team focuses on monitoring, improving the habits of building occupants and educating the faculty, staff and community about energy efficiency and environmental stewardship.